

How Does Fintech Affect Corporate Supply Chain Resilience?

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Abstract. Under constant external shocks, the stability of supply chain is confronting severe challenges. However, the rapid development of fintech is driving the innovation and transformation of supply chain, which improves corporate ability to resist those shocks and maintain supply chain stability. Based on the study of the impact of fintech on supply chain, this paper finds that fintech has a promoting effect on supply chain resilience. Specifically, via the application of blockchain, big data, artificial intelligence and other related technologies, fintech exerts an influence on the supply chain resistance and supply chain recovery through the channels of financial constraints, supply chain transparency, inter-firm coordination efficiency, and enterprise risk management capability, thereby enhancing the supply chain resilience. In addition, heterogeneity analysis reveals that larger corporations and state-owned enterprises usually hold an advantage in applying fintech while fintech's positive effect on supply chain resilience in Small and Medium-sized Enterprises and non-stated-owned enterprises is more pronounced.

Keywords: Fintech, supply chain resilience, financial constraints, transparency, risk management.

1. Introduction

In contemporary business practices, supply chain management plays a crucial role in enabling corporations to address the challenges posed by globalization [1]. However, the global supply chain is presently confronting successive waves of threats and challenges, including the trade friction, Covid-19, severe natural hazard and political turbulence. Supply chain is weathering uncertainty shocks arising from these multiple events [2], which have a negative impact on corporate performance and hamper the long-term stable development of corporations [3]. Based on these severe external challenges, corporations must enhance their adaptability and risk resistance to maintain supply chain stability and ensure normal operations against those external shocks. This capacity is also termed "resilience" [4]. Supply chain resilience is particularly important for corporations when confronting the changing market and sophisticated external shocks [5].

In the meantime, with the rapid advancement of technologies such as blockchain, big data analytics, artificial intelligence, cloud computing, Internet of Things, fintech has emerged, redefining the paradigm of traditional finance and providing innovative insights and solutions for strengthening supply chain resilience [1, 6]. Traditional supply chain, which faces a range of challenges like information asymmetry, high transaction costs and lack of information sharing, has found a solution with the emergence of fintech. Fintech has improved the current state, revitalized supply chain and ultimately reshaping its entire landscape.

Given this background, this study focuses on the influence of fintech on supply chain. It decomposes supply chain resilience into supply chain resistance and supply chain recovery, investigating the multi-dimensional impact of fintech on supply chain resilience from the perspectives of financial constraints, supply chain transparency, inter-firm coordination efficiency, and enterprise risk management capability. This paper constructs a comprehensive framework for examining the impact of fintech on supply chain and investigates the heterogeneous effects across firm size and corporate ownership types.

The contribution of this paper includes its development of a systematic framework for interdisciplinary integration. In practical terms, this paper has positive implications in such aspects as enhancing the resilience of supply chain, ensuring supply chain's sustainable operation, and

promoting the high-quality development of the real economy, and provides certain reference for governments to formulate relevant policies and to regulate the financial industry.

2. What Is the Definition of Supply Chain Resilience?

Supply chain is a network composed of a variety of different node enterprises. It jointly provides merchandise and services to the end customers through reciprocal logistics collaboration and information integration [7]. In recent years, geopolitical conflict, intensification of international trade dispute, COVID-19, natural disasters and other multiple macro-factors have brought unprecedented challenges to the stability of supply chain, affected the regular operation of enterprises and created significant uncertainty. Confronted with these difficulties and challenges, firms are required to develop their capabilities of adaptability and risk resistance to maintain the continuous supply of products and services to end customers and sustain the steadiness of supply chain [4]. Therefore, given the current circumstances, the concept of “supply chain resilience” was put forward. How to improve supply chain resilience to cope with external challenges has attracted considerable interest, which is of great significance for firms to achieve sustainable growth, thus attracting in-depth research from scholars.

Supply chain resilience refers to the ability to maintain stability, preventing disruptions when affected by external disturbances and quickly recover to the pre-disturbance operational state after disruptions [8]. Several scholars have divided supply chain resilience into resilience and robustness [9] and certain scholars categorized it into supply chain resistance and supply chain recovery [4]. Fundamentally, robustness has the same meaning as resistance, referring the ability of firms to sustain the relative stability of supply chain and resist disruptions when the external environment changes. And resilience is essentially analogous to supply chain recovery of which the meaning is the ability to quickly return to pre-disruption operational status after an interruption. The former centers on resisting disruptions and insulate from the impact of external shocks, while the latter emphasizes the ability to response quickly and recover to the initial state after suffering an interruption. The firm that possesses both abilities implies that it has stronger supply chain resilience, which enables it to address external challenges more efficiently, guarantee the sustainability of supply chain, help it better survive in a volatile and changing environment as well as advance its sustainable development and boost its long-term competitiveness [4]. This paper chooses to analyze the effect of fintech on supply chain resilience from the dimension of resistance and recovery, offering certain contributions to the stable development of supply chain.

3. The Impact of Fintech on Supply Chain Resilience

Fintech is an emerging interdisciplinary field that represents the integration of finance and technology. It applies technologies such as blockchain, big data, artificial intelligence and Internet of Things to the field of finance, and it leverages these technologies to innovate and transform the traditional financial services, products and models [10, 11]. With the innovation and advancement of technologies, fintech is transforming the traditional financial structure and driving the financial industry to achieve higher quality and more efficient development [7]. Within the key areas of supply chain management, fintech also has an extensive and profound impact, and it is redefining the global business environment [1].

Developed in response to the prevailing trends, fintech has provided supply chain management with numerous innovative ideas and solutions. It offered a revolutionary tool to enhance supply chain resilience, and became a key driver behind it [6]. By utilizing technologies, such as blockchain, big data and artificial intelligence, the transparency of the supply chain can be improved. The transaction process can be simplified and the problems of information asymmetry and high transaction cost can be solved [4]. Integrating the Internet of Things, machine learning and other technologies into supply chain can enhance enterprises' operational efficiency, reduce costs, and strengthen their long-term

competitiveness [6]. Moreover, fintech can provide Customized Service, flexible financing approaches, real-time credit assessment and risk management capabilities, which enhances the supply chain resistance and supply chain recovery of corporations from numerous aspects and thus achieving the overall improvement of supply chain resilience.

3.1. Improve Supply Chain Resistance Through the Alleviation of Financing Constraints

Fintech has transformed the traditional financing model, which requires companies to provide physical collateral or have a stable financial track record. Using technologies such as blockchain, big data analytics, AI risk evaluation, financial institutions can conduct a comprehensive and dynamic assessment of companies. This reduces the information asymmetry, expands the scope of information usage, enhances the transfer efficiency of information, making credit approval more accurate and effective, and thus effectively eases financing constraints [4, 12]. Additionally, the financing process can be simplified and the transaction cost can be reduced. As a result, companies are able to obtain funds more quickly which improves the capital liquidity [6]. Therefore, for enterprises, especially those small and medium-sized enterprises that face greater difficulty and higher costs in securing financing, timely access to funds enables them to maintain capital stability, sustain continuous business operations when confronting external shocks and volatility, and enhance the resilience of their supply chains against disruptions.

Flexible and personalized financial products and services are other major advantages brought by fintech. With the assistance of fintech, companies can analyze their financial conditions and market situation with greater accuracy and efficiency, thereby allowing for the real-time adjustment of financing strategy and effective allocation of financial resources [6]. Based on the efficient information processing and risk assessment capabilities, as well as the new financial tools and platforms that fintech provides, corporations are able to broaden their financing channels to meet its financing needs [12]. The integration of fintech and supply chain creates synergistic supply chain finance. This allows the upstream and downstream partners to obtain supply chain finance through financial institutions, facilitating timely capital recovery and optimizing supplier relationships [4, 13]. In times of high market volatility and supply chain disruption, companies can use fintech to obtain personalized solutions, rapidly adjust their tactics, and optimize capital allocation. Through diversified financing channels and collaborative supply chain finance, enterprises can maintain stable cash flow, ensure smooth supply chain operations, and mitigate the risk of supply chain disruption.

3.2. Enhance Supply Chain Resistance Through Improved Inter-firm Coordination Efficiency

Fintech provides the technological foundation for building a robust and diversified supply chain network. This empowers upstream and downstream participants to enhance their collaborative capabilities, improve operational efficiency, and better withstand potential disruptions [6]. The adoption of blockchain significantly improves supply chain's transaction transparency and it establishes a decentralized trust network. In contrast to the traditional supply chain operational model, all participants in supply chain share the information network, forming an organic and unified whole [2]. Through the mutual trust and coordination among the participants, efficient capital flow can be facilitated, which reduces the reliance on financial institutions, leading to a substantial improvement in the collaborative efficiency and resilience of the entire supply chain [14]. Simultaneously, smart contracts can streamline the communication and strengthen the linkages between companies and financial institutions, safeguarding the security of every transaction. Its storage on the blockchain network enables autonomous execution upon fulfillment of preset conditions. This automation of sophisticated procedures augments trust and facilitates coordination between financial institutions and corporate entities [14].

When facing the external uncertainty, all parties in the supply chain must possess the capability to adapting rapidly to changes [7]. By harnessing timely and precise data, information and the supply chain collaboration synergy, emerging technologies including artificial intelligence, big data analytics enable sustained the operational stability for supply chain and strengthen its ability to withstand

interruptions [3]. Through interconnected supply chain networks, partner firms can communicate in a timely manner and adjust their strategies accordingly. Supported by the financial backing from the supply chain, enterprises can better respond to the changes in external environment, including the social unrest and economic depression, to ensure the continuous and stable operation of supply chains [4, 13].

3.3. Improve Supply Chain Recovery Through Increase in Transparency

The development and adoption of big data analytics, blockchain, artificial intelligence and other related technologies in the financial sector leads to a substantial increase in the transparency of supply chain. Blockchain employs distributed ledger technology, which is driven by a consensus mechanism to record transactions in an immutable manner [9]. Endowed with characteristics of decentralization, traceability, immutability and smart contracts, blockchain breaks down information barriers on supply chain. By recording and sharing the data, the problem of information asymmetry can be mitigated, improving visibility and transparency of supply chain [14].

Information is isolated between nodes on traditional supply chain, leading to a lack of efficient information channels, inefficient processes, and delayed risk identification [2]. When participating entities in a supply chain face externally triggered disruptions, low information transparency and an inability to share data prevent other entities in the traditional chain from mounting an effective response. Nevertheless, fintech's integration of material, information, and capital flows leads to a marked increase in supply chain transparency for firms. By enhancing transaction security and enabling automation, fintech strengthens trust between suppliers, leading to reduced response times across the supply chain and improved operational efficiency and sustainability [4, 6, 15]. As a result, supply chain can return to its original state quickly and thereby strengthening supply chain recovery.

3.4. Enhance Supply Chain Recovery Through Reinforcement of Risk Management Capability

Risk management is crucial for the sustainability of supply chain and can enhance the supply chain recovery [16]. By analyzing massive datasets, big data analytics enhances corporate comprehension of supply chains, improves operational risk management, and facilitates timely post-disruption adjustments. This leads to the development of a precision-based decision-making framework [3]. By enabling real-time monitoring of supply chain transaction and instantaneous information sharing and verification among all supply chain partners, blockchain allows corporations to identify potential risks more rapidly and respond swiftly to disruptions [2, 6]. Equipped with the capability to identify, interpret, infer, and learn from data, artificial intelligence helps to solve various management problems in sales, procurement, manufacturing, and delivery processes in supply chain. Rooted in considerable empirical data, it helps corporations anticipate multi-layered risks and their impacts within the environment, enables the formulation of risk mitigation approaches, and is utilized as a routine component of risk assessment and management activities [3, 17].

In addition, leveraging financial technologies such as big data and artificial intelligence to analyze large-scale market datasets helps enterprises identify new potential partners, this diversifies supply chains, optimizes supply chain structures, and mitigates risks associated with over-reliance on key suppliers and customers, thereby helping withstand external shocks. Even when key suppliers and customers face disruptions, enterprises can still resume the normal operation of their supply chains via their other diversified supply channels, ultimately strengthening the resilience of their supply chains [4]. The pivotal role of fintech in collaborative supply chain finance also contributes to capital diversification, ensures stable cash flow, and reduces financial and credit risks within supply chains [13]. The overall enhancement of corporate risk management capabilities means that corporations are no longer passive reactors to supply chain disruptions. Instead, they proactively identify and assess risks prior to an interruption and, with the aid of fintech, actively formulate response strategies. This significantly accelerates the speed and improves the efficiency of restoring normal supply chain operations.

4. Heterogeneity Analysis

4.1. Heterogeneity Analysis of Firm Size

The impact of fintech on corporate supply chain resilience exhibits scale heterogeneity. In general, large enterprises usually have access to more plentiful resources, stronger resource procurement abilities, more advanced technological prowess, and broader human capital. These factors provide them with prerequisite conditions for better integrating the advantages brought by fintech into their supply chain operations. Owing to their advantages in capital acquisition, large enterprises are more inclined to invest in cutting-edge fintech, thereby enhancing their supply chain management capabilities and improving operational efficiency. Furthermore, large enterprises possess more sophisticated risk management systems and more advanced risk management tools. Through their structural advantages, large-scale enterprises can respond to disruptions more effectively in turbulent market conditions [6].

However, there is empirical evidence demonstrating that the improvement in supply chain resilience facilitated by fintech is more pronounced among small and medium-sized enterprises. The supply chain networks in larger enterprises tend to be more complex, whereas the supply chain management system in small and medium-sized enterprises is comparatively weaker and exhibits a higher level of supply chain concentration [2, 4]. Because larger enterprises that often possess greater market influence and lower financing costs, can expand their supply chain networks at a lower cost while simultaneously enhancing supply chain flexibility [6]. In contrast, small and medium-sized enterprises with high supply chain concentration focus on their key suppliers, exhibit higher dependency on these critical partners, and consequently face greater disruption risks. As a consequent, the mitigating effect of fintech is more pronounced for them, yielding higher marginal utility and showing a more significant positive impact on enhancing their supply chain resilience.

4.2. Heterogeneity Analysis of Corporate Ownership Types

Compared to state-owned enterprises (SOEs), the advancement of fintech has a more pronounced impact on non-state-owned enterprises (NSOEs) [4, 12]. With state credit backing and policy support, SOEs enjoys access to diversified funding sources, reduced financing costs, as well as a robust risk management framework [6, 12]. In these aspects, NSOEs are often at a disadvantage. However, enabled by enhanced credit and risk assessment capabilities brought by fintech, along with the reduced information asymmetry, traditional collateral-dependent lending practices are being transformed [4]. The challenges of limited financing channels and high financing costs for NSOEs have been effectively alleviated, resulting in a substantial enhancement of their supply chain resilience. Given their pre-existing advantages, SOEs experience diminished marginal gains from fintech in terms of supply chain resilience enhancement.

Nevertheless, driven by national policy incentives and under a stricter regulatory framework, SOEs tend to demonstrate more prompt and rapid responses. Owing to their structural advantages, SOEs often gain priority access to financial resources. This facilitates their rapid adoption and development of fintech, boosting long-term competitive advantage in response to continuous market changes. Beyond this, SOEs generally possesses larger scale and more robust risk management capabilities. Given the more favorable policy bias and financial treatment they receive, SOEs typically possess stronger capabilities to promote fintech adoption across its supply chain and therefore improving supply chain resilience [1, 6].

5. Conclusion

This paper examines the impact of fintech on supply chain resilience. Grounded in scientific technologies such as blockchain, big data analytics, artificial intelligence and Internet of Things, fintech can alleviate financing constraints, improve inter-firm coordination efficiency, increase supply chain transparency and reinforce risk management capabilities. Among these, the alleviation

of financing constraints and improved inter-firm coordination efficiency contribute to the enhancement of supply chain resistance, while the increase in transparency and reinforcement of risk management capability increase supply chain recovery when facing disruptions. Supply chain resistance and recovery represent two essential aspects of supply chain resilience, demonstrating fintech's promoting effect on it. The impact of fintech on corporate supply chain resilience, however, is heterogeneous across firm size and ownership structure. While large firms' superior resources and technological capabilities facilitate more effective fintech application, the very limitations of Small and medium-sized enterprises make fintech's positive effect significantly greater. While SOEs demonstrate quicker responses to fintech by utilizing their structural strengths, NOEs experience a more substantial enhancement in supply chain resilience from fintech.

Although this study systematically integrates the impact of fintech on supply chain resilience from the perspectives of financial constraints, inter-firm coordination efficiency, supply chain transparency and risk management capability, there may still be other underlying mechanisms that have not been revealed, which warrant further investigation in the future. And upon reviewing the literature in this field, it was found that most studies on the impact of fintech on supply chain resilience are based on data from China. Subsequent research that incorporates a cross-national perspective would enrich this theoretical framework and provide valuable theoretical guidance for global supply chain stability.

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